WHO/UNICEF
JOINT PROGRAMME
ON

DATA MANAGEMENT AND MAPPING

for Public Health - HealthMap

Division of Control of Tropical Diseases
WORLD HEALTH ORGANIZATION

UNITED NATIONS CHILDREN'S FUND

04832
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CALL NO. PH-100 N95 ACC. NO. 04832

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TITLE Joint programme on data Management & Mapping for public health - Health Map

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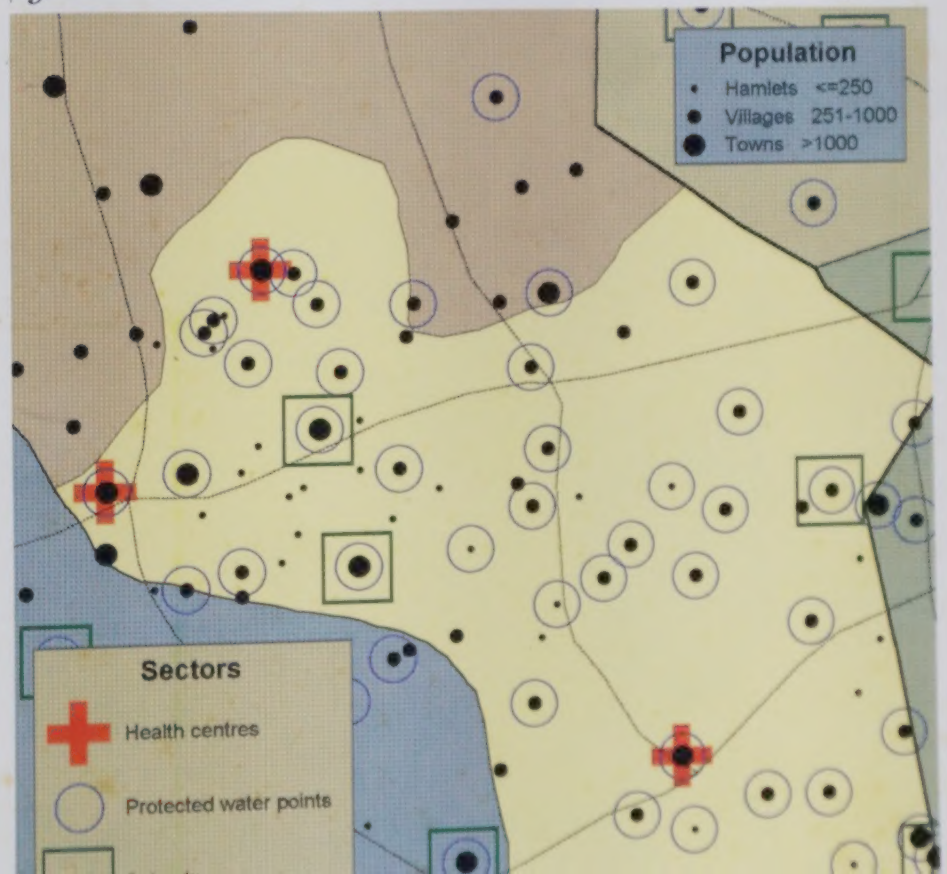

Division of Control of Tropical Diseases
WORLD HEALTH ORGANIZATION

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WHO/UNICEF Joint Programme on Data Management and Mapping for Public Health

Mapping for Public Health
Programme Integration
Disease Control
National Planning
District Planning
Data Base
Base Maps
Services and Products
Resource Network, Partners and Contacts

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Printed in New Delhi,1995 at Swaraj

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Mapping for Public Health

Public health resources and specific diseases can be mapped in relation to their surrounding environment and existing health and social infrastructures. Such information, when mapped together creates a powerful tool for management, analysis and follow-up for decision-makers in public health administration.

Computer-aided data base management and mapping technologies provide a flexible and speedy way to harness these powerful analysis functions making it possible to easily generate maps and monitoring reports on the situation of public health programmes.

This map shows the locations of guinea worm endemic villages in 17 endemic countries in Africa, as known and mapped in 1994. The map clearly highlights regions where prevalence of the disease is highest and where resources to combat it are most required.

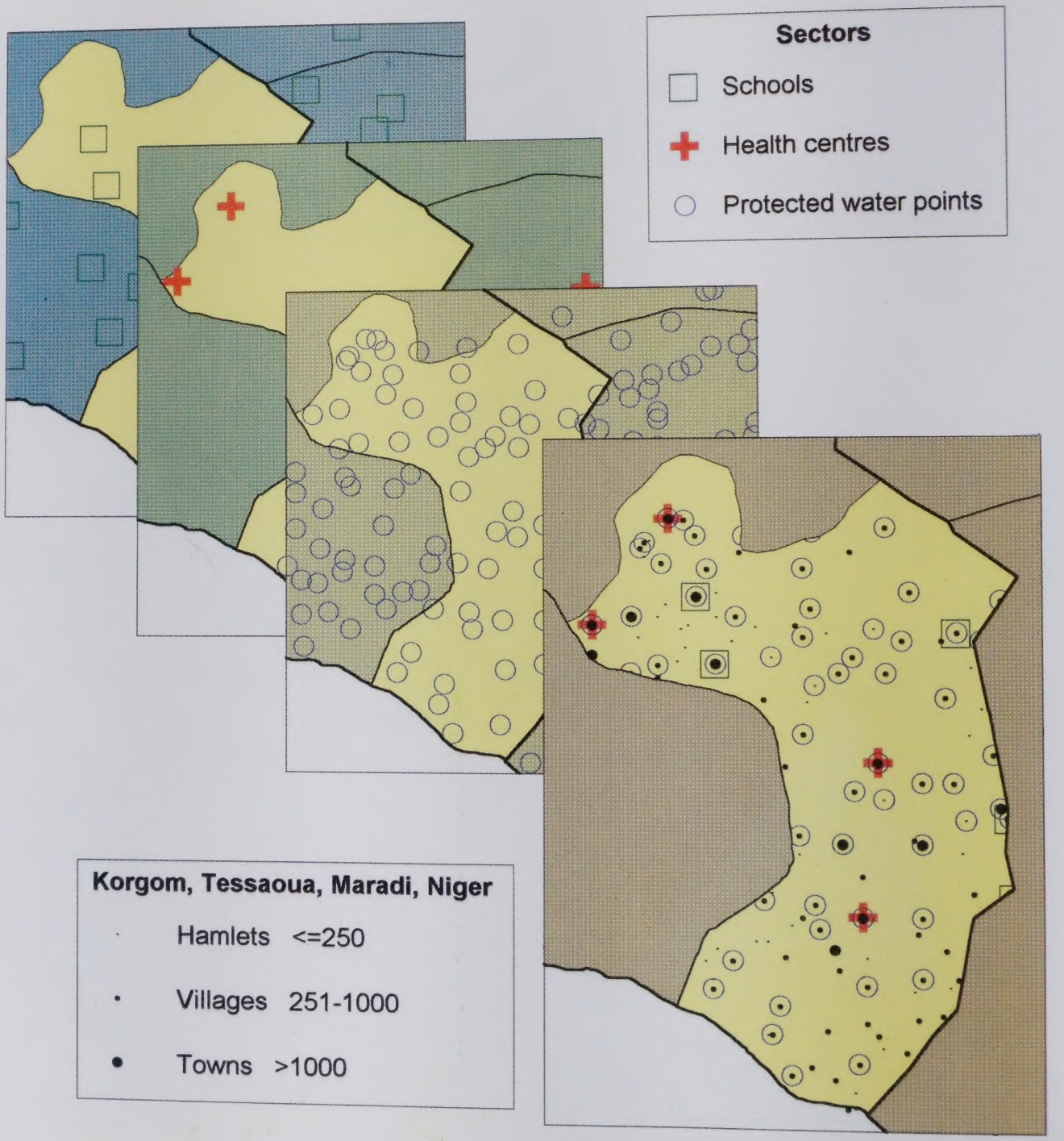
Locations of African villages which reported cases of guinea worm disease in 1994

Programme Integration

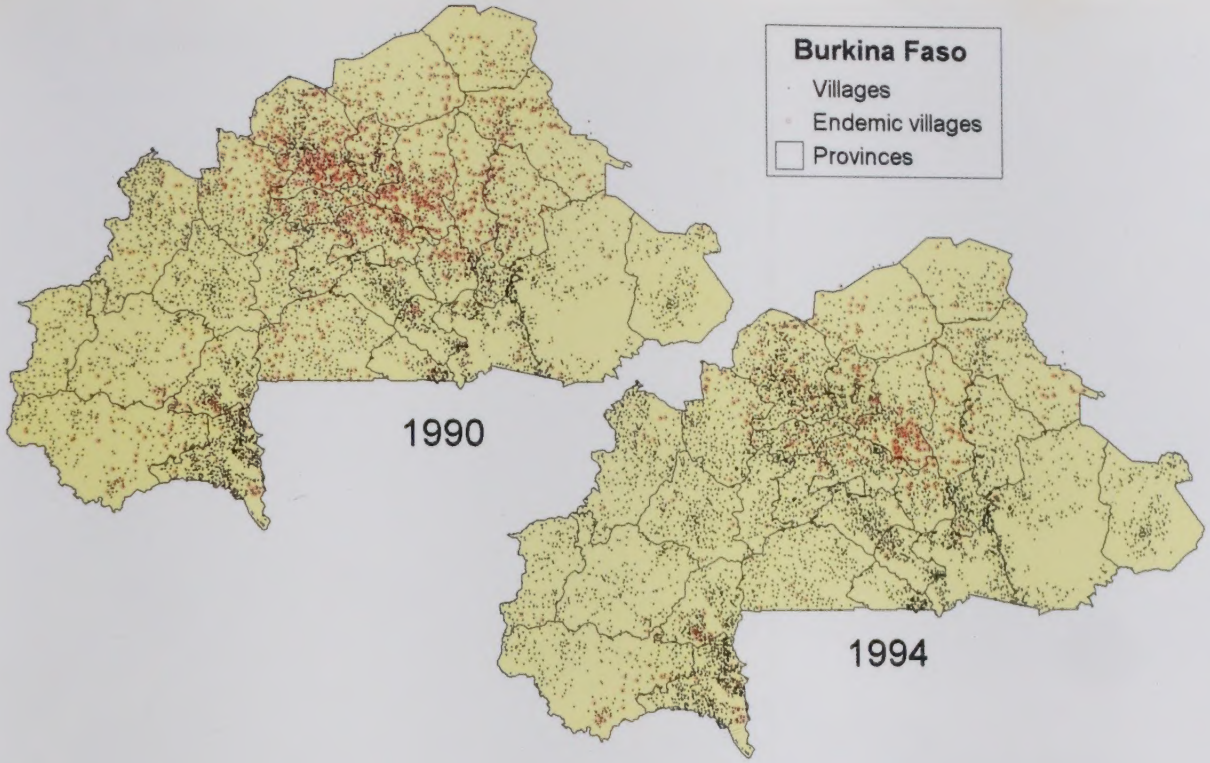
Public health programmes are often organised by individual sectors and implemented vertically. It is a major challenge, particularly at the district and community levels, to integrated programme activities, especially when the resources are inadequate.

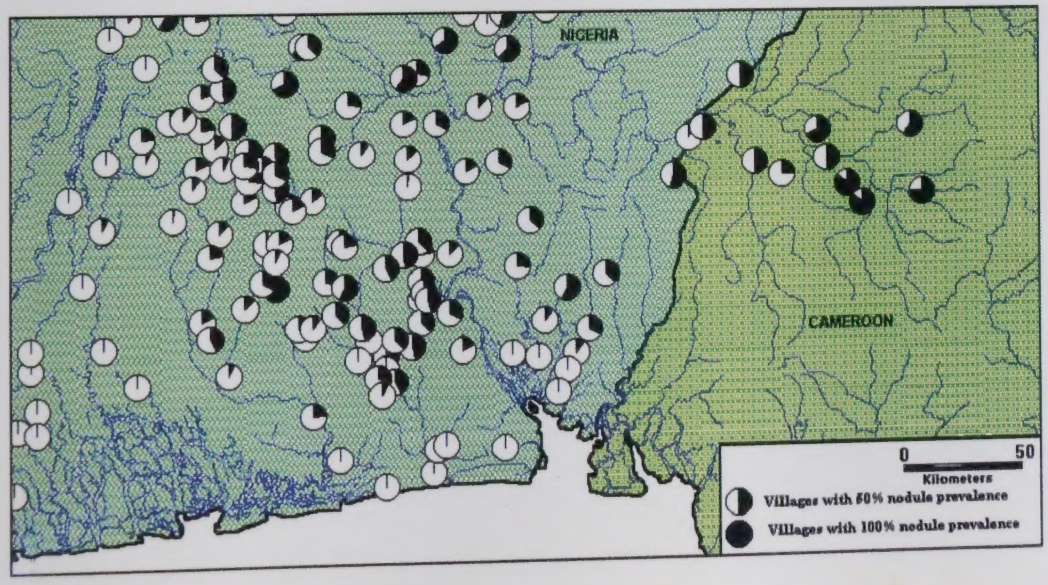
It is possible to combine public health information from different sectors into a single map to help planners better understand the public health situation of individual communities. By showing the locations of villages, schools, health centres and protected water sources all on the same map, it is easier for decision-makers to assess how to allocate available programme resources across sectors to achieve the most rapid development of healthy communities.

For example, this multisectoral map shows the locations of several villages in the *canton* of Korgom, *arrondissement* of Tessaoua, *département* of Maradi, Niger, which do not have schools, health centres or protected water points.



Integration of health, education, water sectors for improved programme coordination





Disease Control

Many people living in under-developed areas of the world struggle to survive in harsh environments with limited food to eat and nothing to drink but meagre quantities of impure water. These people, who are among the most deprived in the world, are exposed to many types of tropical diseases which cause dreadful suffering and disability.

Dracunculiasis One such tropical disease is dracunculiasis which is caused by the worm *Dracunculus medinensis*, or guinea worm. By mapping the locations of guinea worm endemic villages, it has been possible to improve the capabilities of health administrators to monitor the eradication of the disease. The maps on the left above show the success achieved in Burkina Faso, with a significant decrease in the number of endemic villages between 1990 and 1994. Similar reductions have been achieved in other endemic countries. Such maps assist in monitoring the stages of dracunculiasis eradication and the subsequent stages of certifying eradication of the disease.

Mapping Other Tropical Diseases Mapping technologies have also been used since 1992 in CTD/WHO to support the control of schistosomiasis. In addition, in 16 African countries, CTD in collaboration with the African Programme for Onchocerciasis Control (APOC) is using mapping methodologies to identify the high risk areas for onchocerciasis. Once the high risk areas have been identified, the WHO/UNICEF Programme on Data Management and Mapping will assist in the identification of village locations and health services coverage within the defined areas to facilitate planning of drug distribution to the infected population. In the future, data management and mapping technologies will be used to strengthen surveillance of onchocerciasis in Onchocerciasis Control Programme countries as well as to assist in the control of other tropical diseases, such as, malaria, African trypanosomiasis, the leishmaniases, filariasis and leprosy.

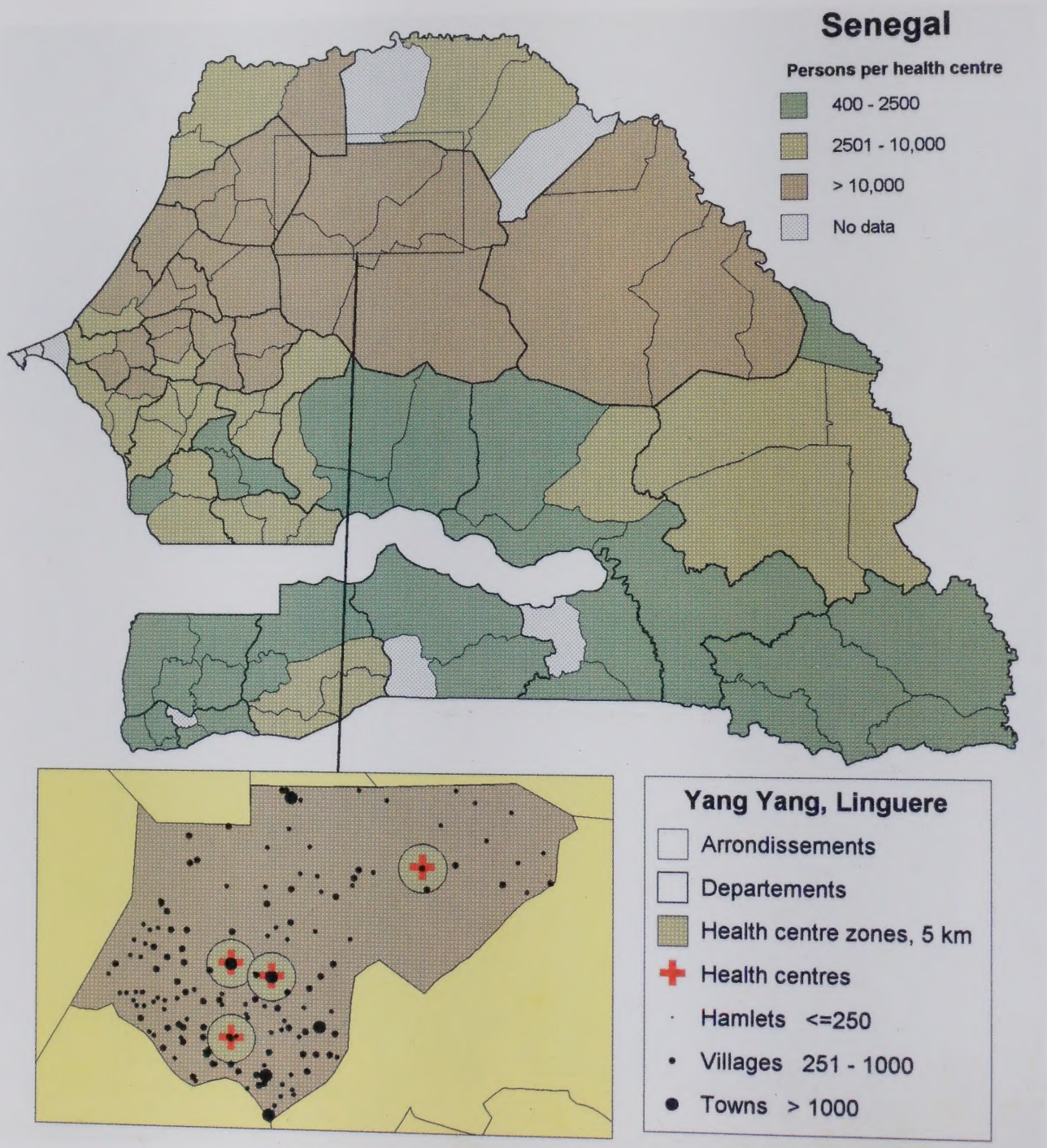
Disease control by mapping guinea worm endemic villages in Burkina Faso (above) and onchocerciasis in Nigeria and Cameroon (below).

National Planning

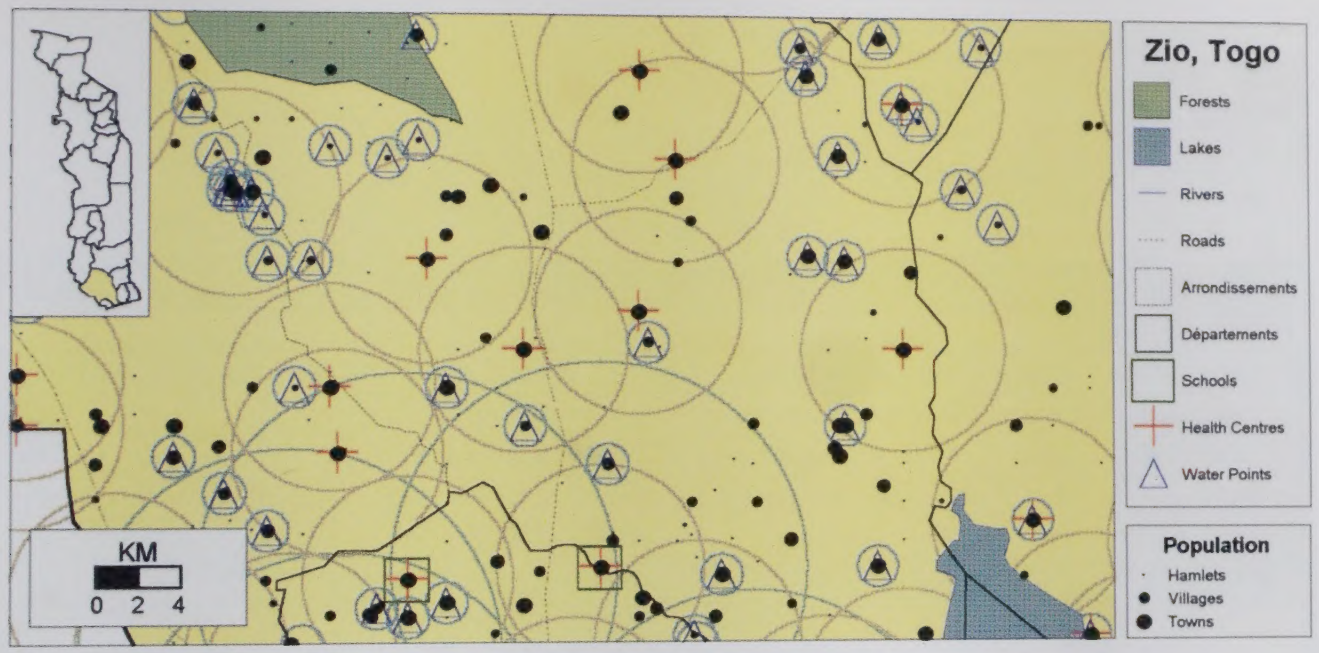
National planning for public health administration can be strengthened by mapping the location of health centres with respect to the locations and population sizes of villages. One can assess the situation at the national level, then, zoom in on a province or district where the data illustrate that further analysis and follow-up action are required.

For example, on this map, the situation as known in 1994 shows that 727 of the 10,630 registered villages in Senegal have health facilities. This map shows the distribution of persons per health centre at the district, or *arrondissement*, level. By zooming in on the map, it is possible to identify those districts where a significant proportion of the population live more than five kilometres away from the nearest health centre. For example, there are only four health centres in Yang Yang, Linguere. In this district, 152 of the 164 hamlets, villages and towns are more than five kilometres away from the nearest health centre.

This kind of information is vital to national public health planners who must target additional outreach services to districts with low access to health services for programmes such as immunization and polio eradication.



National level map of Senegal showing locations of health centres with respect to the population

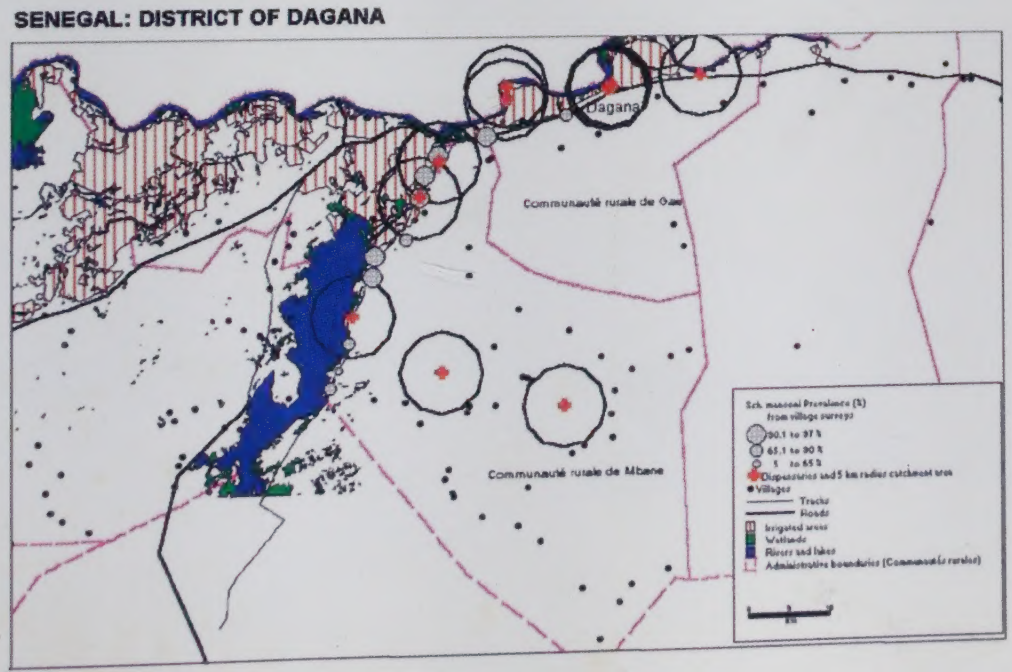


District Planning

District planning for public health administration can also be strengthened by mapping district level infrastructure in relation to the locations and sizes of villages.

By mapping all health facilities, schools and protected water points, it is possible to analyze where the greatest needs are for the allocation of resources available for public health. The map on the left above shows Zio District, in the Region of Maritime, Togo. The map illustrates which villages are within 1 km of a protected water point, 5 km of a health centre and 10 km of a school.

District-level mapping can also be used to analyze environmental factors which may have an impact on disease control. As shown in the map of Dagana District, Senegal, on the left below, public health administrators are working with planners from various other departments of the government to map villages, schools, roads, irrigated areas and health facilities in relation to the prevalence of schistosomiasis. This map shows how schistosomiasis prevalence is closely associated with irrigated areas.



District level maps showing the locations of villages, health centres, schools, protected water points and environmental factors useful for public health administration

Data Base

Through collaboration with national governments of UN Member States, a data base has been established comprising baseline village level data. These data can be combined with public health survey data, such as, disease control data, to create tailor-made maps and monitoring reports.

Each country data base includes:

- administrative units (including subnational levels)
- village names and locations
- population estimates
- locations of schools
- locations of health centres
- locations of protected water sources

The data bases are available in several standard formats for use with common data base and spreadsheet software programs, such as: dBASE (DBF), FoxPro (DBF), Access (DBF), Lotus 1-2-3 (WK1) and Excel (XLS).

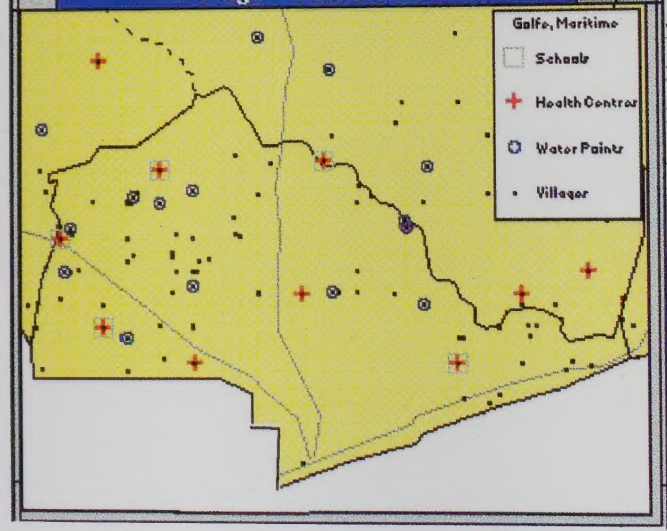
Village Baseline Data Catalogue Baseline data of many countries, especially African countries, are available with locations of villages, health centres, schools and safe water points. A catalogue is available on request. See back for contact details.

Table - TOGO:Data Base

TOGO:Data Base

CODE	ADMIN1	ADMIN2	ADMIN3	VILLAGE	LON	LAT	POP	SCHOOL	HEALTH	WATER
117104C	Maritime	Golfe	Sanguera	Madjikpeto	1.133300	6.251600	710	0	0	0
117168C	Maritime	Golfe	Amoutive	Massouhouin	1.250000	6.216600	751	0	0	0
117424C	Maritime	Golfe	Baguida	Noudo-kope	1.303800	6.153300	268	0	0	0
117552C	Maritime	Golfe	Aflao	Sagbado	1.133300	6.183300	2507	0	0	2
					.105000	6.216600	408	0	0	0
					.100000	6.233300	517	1	1	0
					.121600	6.188300	641	1	1	0
					.321600	6.188300	79	0	0	0
					.155800	6.224100	478	0	0	0
					.304000	6.183300	57	0	0	0
					.233300	6.271600	1065	1	1	0
					.200000	6.206600	2557	0	0	0
					.166600	6.216600	1056	0	0	0
					.101600	6.216600	1009	0	0	3
					.339900	6.189600	247	0	0	0
					.109500	6.217200	814	0	0	0
					.068200	6.451600	172	0	0	2

Page - TOGO.PRJ



Data base of Togo with village baseline data including locations of schools, health centres and protected water points

Base Maps

A library of digital base maps is available for use with desktop mapping software and geographic information systems. These maps are collected, reviewed and updated in the exchange of information with UN Member States, UN agencies and other partners.

The maps include, among other things:

- ☐ administrative boundaries
- ☐ rivers and streams
- ☐ roads
- ☐ population estimates by area
- ☐ elevation

Formats These maps are available in standardised vector formats for use with common desktop geographic information systems, such as, Atlas GIS (AGF) and MapInfo (MID) formats. They can also be made available, upon specific request, in other formats such as ArcInfo (E00) and AutoCAD (DXF) among others.

Basemap Catalogue Maps of all countries are available at the national level with rivers and roads. Maps of many countries, especially African and Asian countries, are available with sub-national administrative boundaries. A catalogue is available on request.

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Base map of Côte d'Ivoire with administrative boundaries, rivers and roads

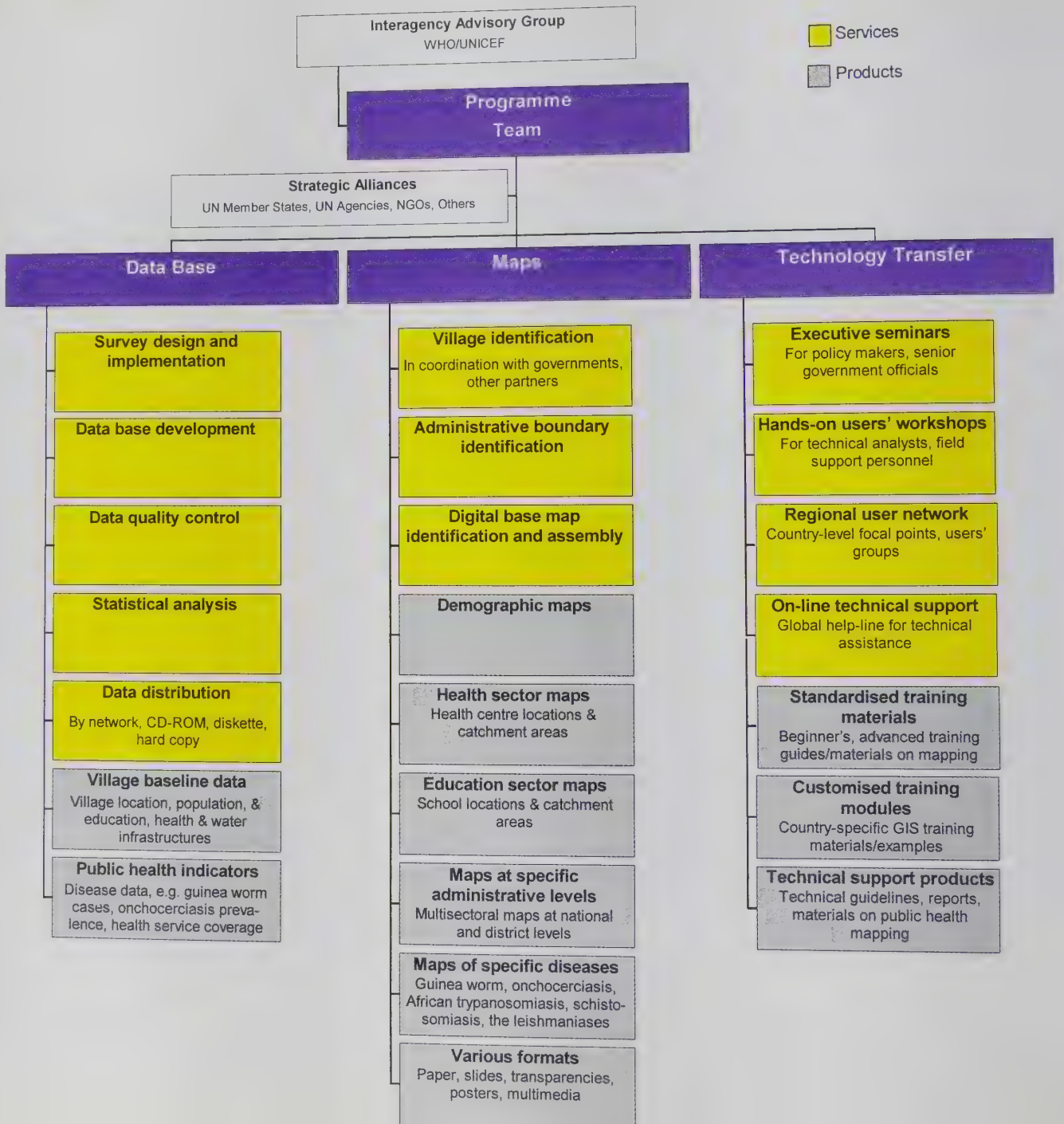
Services and Products

The WHO/UNICEF Joint Programme on Data Management and Mapping provides a broad scope of services and products related to the production and use of maps to support public health planning. These services and products are offered either directly or indirectly, through a sub-contracting arrangement, through the programme team based within the Division of Control of Tropical Diseases, in WHO, Geneva. This team serves as a technical liaison between clients and service providers.

The services and products offered by the programme fall under one of three categories:

- Data Management
- Map Production
- Technology Transfer

The diagram on the right lists the types of services and products available under each category.


Interagency Advisory Group
WHO/UNICEF
Services
Products
Programme Team
Strategic Alliances
UN Member States, UN Agencies, NGOs, Others
Data Base
Survey design and implementation
Data base development
Data quality control
Statistical analysis
Data distribution
By network, CD-ROM, diskette, hard copy
Village baseline data
Village location, population, & education, health & water infrastructures
Public health indicators
Disease data, e.g. guinea worm cases, onchocerciasis prevalence, health service coverage
Maps
Village identification
In coordination with governments, other partners
Administrative boundary identification
Digital base map identification and assembly
Demographic maps
Health sector maps
Health centre locations & catchment areas
Education sector maps
School locations & catchment areas
Maps at specific administrative levels
Multisectoral maps at national and district levels
Maps of specific diseases
Guinea worm, onchocerciasis, African trypanosomiasis, schistosomiasis, the leishmaniases
Various formats
Paper, slides, transparencies, posters, multimedia
Technology Transfer
Executive seminars
For policy makers, senior government officials
Hands-on users' workshops
For technical analysts, field support personnel
Regional user network
Country-level focal points, users' groups
On-line technical support
Global help-line for technical assistance
Standardised training materials
Beginner's, advanced training guides/materials on mapping
Customised training modules
Country-specific GIS training materials/examples
Technical support products
Technical guidelines, reports, materials on public health mapping

Resource Network

In 1993, WHO and UNICEF formed a joint programme on mapping and geographic information systems for the Dracunculiasis Eradication Programme. A programme, known as DEPGIS, was established within Dracunculiasis Eradication Unit of CTD at WHO, Geneva, to provide technical assistance to national governments in the identification and mapping of all endemic villages. Over time, the combination of the successful WHO/ UNICEF collaboration, the broader applicability and the increasing demand from countries have resulted in an evolution of the capacities and objectives of the programme, making it technically feasible to map not only the guinea worm endemic villages, but virtually all known villages in the endemic countries in Africa, as well as most other villages in African countries south of the Sahara. Within 2 years of operation, a databank has been created containing public health information on over 78,000 villages in 20 countries in Africa. Whilst the programme will continue to support the guinea worm endemic countries, it will now also aim to expand its data management and mapping activities to all countries in Africa south of the Sahara and to any other country which requests services.

Focal Points and Users' Groups Building on the resources and experiences existing in CTD, the programme also seeks to strengthen national and regional level capacities in monitoring and mapping capabilities, through the identification of national and regional level technical institutes and technical capacities. To date, the programme has enabled the establishment of a resource network in 17 countries. In each of the 17 countries a GIS focal point and a team of GIS users have been trained. These users are from the Ministries of Water, Health and Planning. They also include technical experts from WHO/UNICEF and other NGOs. A list of focal points and users' groups is available on request. The programme has worked closely with the WHO/UNICEF Interagency Technical Teams for West and East Africa, who provide technical assistance to countries in the implementation of integrated community based surveillance systems and in planning operational outreach strategies.

Partners

- UN Member States -- Benin, Burkina Faso, Cameroon, Central African Republic, Chad, Côte d'Ivoire, Ethiopia, Ghana, Guinea, Kenya, Mali, Mauritania, Niger, Nigeria, Pakistan, Senegal, Sudan, Togo, Uganda, Yemen, among others
- UN Agencies -- United Nations Population Fund (UNFPA), United Nations Environmental Programme/Global Resource Information Database (UNEP/GRID), United Nations Development Programme (UNDP), the World Bank, the Food and Agriculture Organization (FAO), the United Nations Department of Development Support and Management Services (UNDDSMS) and country and regional offices of WHO and UNICEF
- French Cooperation
- USAID/Famine Early Warning System
- United States Peace Corps
- USBGN US Board of Geographic Names funded by US Geographic Survey

The programme welcomes new partnerships to strengthen the international network for use of improved data management and mapping for public health.

Contacts

To obtain more information on the programme and its activities, to request a specific mapping service, to obtain more information on training programmes or to access the data base and mapping system, please contact:

Mr Jean-Pierre Meert and Ms Kathy O'Neill

WHO/ UNICEF Joint Programme on Data Management and Mapping for Public Health within the Division of Control of Tropical Diseases (Director: Dr Kazem Behbehani), Dracunculiasis Eradication Unit (Chief: Dr Philippe Ranque), World Health Organization, 1211 Geneva 27, Switzerland.

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For more information on the Interagency Technical Assistance Teams and their activities --

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